

## **REMARKS**

Claims 39-96 have been canceled without prejudice or disclaimer. Claims 97-149 have been added and therefore are pending in the present application. Claims 97-149 are supported throughout the specification, including the original claims. Furthermore, claims 97 and 138-140 are supported by claims 1 and 28 and the examples which describe a pretreatment step of 1 hour; and claims 102 and 103 are also supported by page 9, line 36 – page 10, line 4 of the specification.

The specification and the abstract of the disclosure have been amended to correct minor informalities.

It is respectfully submitted that the present amendment presents no new issues or new matter and places this case in condition for allowance. Reconsideration of the application in view of the above amendments and the following remarks is requested.

### **I. The Objection to the Abstract of the Disclosure and the Specification**

The Office objected to the abstract of the disclosure and the specification due to minor informalities. As stated above, the abstract and the specification have been amended to correct these informalities. Therefore, the objection has been overcome.

### **II. The Objection to Claims 39-55 and 57-89**

The Office objected to claims 39-55 and 57-89 because they are dependent on canceled claim 1. Claims 39-55 and 57-89 have been canceled without prejudice or disclaimer. Therefore, this objection is rendered moot.

### **III. The Rejection of Claims 38, 47-48, and 59 under 35 U.S.C. 112**

Claims 38, 47-48, and 59 are rejected under 35 U.S.C. 112 as being indefinite. Specifically, the Office stated that "It is unclear what 'gelatinization temperature' is" and "it is unclear what the units of the ratio [AFAU/AGU] are." This rejection is respectfully traversed.

The recitation "initial gelatinization temperature" is defined at page 4, lines 1-2 of the specification as the lowest temperature at which gelatinization of the starch commences.

The units AFAU and AGU are defined in the specification at page 20, line 11 – page 21, line 3 and at page 22, lines 6-18, respectively.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 112. Applicants respectfully request reconsideration and withdrawal of the rejection.

#### **IV. The Rejection of Claims 91-95 under 35 U.S.C. 102**

Claims 91-95 are rejected under 35 U.S.C. 102(b) as being anticipated by Veit et al. (U.S. Patent Application Publication No. 2004/0091983). Claims 91-95 have been canceled without prejudice or disclaimer. Therefore, this rejection is rendered moot.

#### **V. The Rejection of Claims 38, 40-45, 47-48, 55-59, 62-70, and 89 under 35 U.S.C. 103**

Claims 38, 40-45, 47-48, 55-59, 62-70, and 89 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of Yoshizumi et al. (U.S. Patent No. 4,092,434). This rejection is respectfully traversed.

Lutzen discloses a process for the production of ethanol comprising fermentation of an aqueous slurry of granular starch with an ethanol producing microorganism in the presence of alpha-amylase and glucoamylase.

Lutzen further discloses that the process optionally includes a pretreatment step in which the starch slurry is treated with an alpha-amylase and a glucoamylase at temperatures below the initial gelatinization temperature of granular starch. At column 3, lines 6-9, Lutzen states that the pretreatment generates a small proportion of fermentables in the slurry so that the microorganism has nutrient immediately available for initiating fermentation. Furthermore, at column 10, lines 2-5, Lutzen states that "Pretreatment of the starch slurry with either or both enzymes for up to 20 hours at from 30°C to 60°C will serve to hasten the commencement of fermentative generation of

ethanol in the fermentor. All of the working examples which include a pretreatment step have a holding time of at least 3 hours. For example, Example 2 discloses a pretreatment step of 18 hours; Example 6 discloses a pretreatment step between 3-20 hours; and Example 8 discloses a pretreatment step of 4.5 hours.

However, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

Yoshizumi et al. disclose a process for producing an alcohol comprising cooking a mash of cereal grains and liquefying enzymes at a temperature of from 75-85°C, saccharification, and fermentation with yeast. Because the process described in Yoshizumi et al. includes a liquefaction step at a temperature above the initial gelatinization temperature of the starch, the starch is partially gelatinized prior to saccharification and fermentation.

However, Yoshizumi et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast, as claimed herein. Moreover, Yoshizumi et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

**VI. The Rejection of Claims 38-39, 46, 49-51, 54, 61-64, 71-80, and 81-88 under 35 U.S.C. 103**

Claims 38-39, 46, 49-51, 54, 61-64, 71-80, and 81-88 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of Lantero et al. (U.S. Patent No. 5,231,017). This rejection is respectfully traversed.

As discussed in Section V, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

Lantero et al. disclose a process for producing ethanol comprising liquefaction, saccharification, and fermentation, wherein a protease is introduced during saccharification and/or fermentation. Because the process described in

Lantero et al. includes a liquefaction step at a temperature above the initial gelatinization temperature of the starch, the starch is gelatinized prior to saccharification and fermentation.

However, Lantero et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast, as claimed herein. Moreover, Lantero et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

#### **VII. The Rejection of Claims 38 and 53 under 35 U.S.C. 103**

Claims 38 and 53 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of Katkocin et al. (U.S. Patent No. 4,536,477). This rejection is respectfully traversed.

As discussed in Section V, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

Katkocin et al. disclose a *Clostridium* glucoamylase for use in hydrolysis of starch.

However, Katkocin et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast, as claimed herein. Moreover, Katkocin et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

**VIII. The Rejection of Claims 38, 51-52, and 74 under 35 U.S.C. 103**

Claims 38, 51-52, and 74 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of Veit et al. (U.S. Patent Application Publication No. 2004/0091983). This rejection is respectfully traversed.

As discussed in Section V, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

Veit et al. disclose an alpha amylase having an amino acid sequence of SEQ ID NO: 1.

However, Veit et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast, as claimed herein. Moreover, Veit et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

**IX. The Rejection of Claims 91 and 96 under 35 U.S.C. 103**

Claims 91 and 96 are rejected under 35 U.S.C. 103 as being unpatentable over Walmsley et al. (U.S. Patent No. 3,712,820). Claims 91 and 96 have been canceled without prejudice or disclaimer. Therefore, this rejection is rendered moot.

**X. The Rejection of Claims 38 and 60 under 35 U.S.C. 103**

Claims 38 and 60 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of James et al. (U.S. Patent No. 3,880,742). This rejection is respectfully traversed.

As discussed in Section V, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

James et al. disclose a thermostable beta-glucanase and its use in the degradation of glucan substrates such as barley-containing animal feed components and barley mashes.

However, James et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast, as claimed herein. Moreover, James et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

#### **XI. The Rejection of Claims 38 and 55-56 under 35 U.S.C. 103**

Claims 38 and 55-56 are rejected under 35 U.S.C. 103 as being unpatentable over Lutzen (U.S. Patent No. 4,316,956) in view of Leach et al. (U.S. Patent No. 3,922,196) and in view of Gray et al. (Journal of Bacteriology, 1986, 166(2): 635-643). This rejection is respectfully traversed.

As discussed in Section V, Lutzen does not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

Leach et al. disclose for converting granular starch to a soluble starch hydrolysate comprising subjecting a slurry of granular starch to an alpha-amylase and a saccharifying enzyme at a temperature in the range of the initial gelatinization temperature and the actual gelatinization temperature.

Gray et al. disclose alpha-amylases obtained from *Bacillus licheniformis* and *Bacillus stearothermophilus*.

However, Leach et al. and Gray et al. do not disclose a process for fermenting granular starch in the presence of an acid alpha-amylase, a glucoamylase and a yeast at a temperature between 10°C and 35°C, as claimed herein. Moreover, Leach et al. and Gray et al. also do not teach or suggest a pretreatment step for a period between 20 minutes and 1½ hours, as claimed herein.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

## **XII Conclusion**

In view of the above, it is respectfully submitted that all claims are in condition for allowance. Early action to that end is respectfully requested. The Examiner is hereby invited to contact the undersigned by telephone if there are any questions concerning this amendment or application.

Respectfully submitted,

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